consisting of electron, hydrogen, oxygen, nitrogen, helium, fluorine, neon, argon, krypton, air, and N_20.

6. (Amended) The method for reforming the surface of a polymer membrane in accordance with claim 1, wherein the material of the polymer membrane is a polyolefin selected from the group consisting of polypropylene, high density polyethylene (HDPE), low density polyethylene (LDPE), and linear low density polyethylene (LLDPE).

7. (Amended) The method for reforming the surface of a polymer membrane in accordance with claim 1, wherein the material of the polymer membrane is a polyolefin blend or polyolefin laminate, wherein the polyolefins are selected from the group consisting of polypropylene, high density polyethylene (HDPE), low density polyethylene (LDPE), and linear low density polyethylene (LLDPE).

9. (Amended) The method in accordance with claim 1, wherein the polymer membrane is a separator for a lithium ion secondary battery or alkali secondary battery.

15. (Amended) A method for providing hydrophilicity or increased hydrophobicity to the surface of a polymer membrane comprising:

a) inserting a polymer membrane into a vacuum chamber and irradiating the surface of the polymer membrane with energized ionic particles under a high vacuum and under conditions effective to change pore size and shape of the polymer membrane; and

b) treating the surface-activated polymer membrane obtained in step a) by infusing a reactive gas onto the surface of the polymer membrane to cause reaction of the gas with the polymer membrane surface.

17. (Amended) The method in accordance with claim 15, wherein the reactive gas infusion of step b) is made without interference of the ionic particles.

18. (Amended) The method in accordance with claim 15, wherein ion beam irradiation of the step a) and reactive gas infusion of step b) are sequentially made.

19. (Amended) The method in accordance with claim 15, wherein energized ionic particles of step a) are irradiated on one side or two sides of the polymer membrane.

20. (Amended) The method in accordance with claim 15, wherein the ionic particles of step a) are produced from one or more ion generating gases selected from the group consisting of electron, hydrogen, oxygen, helium, nitrogen, oxygen, air, fluorine, neon, argon, krypton, N_20, and their mixtures.

21. (Amended) The method in accordance with claim 15, wherein the dose of irradiation of step a) is from 10^3 to 10^{20} ion/cm^2.

22. (Amended) The method in accordance with claim 15, wherein the energy of ionic particles of step a) is from 10^{-2} to 10^7 keV.

23. (Amended) The method in accordance with claim 15, wherein the high vacuum of step b) is 10^{-2} to 10^{-8} torr.

24. (Amended) The method in accordance with claim 15, wherein the reactive gas of step b) is infused until the pressure of the vacuum chamber reaches the range of 10^{-6} to 10^4 torr.

25. (Amended) The method in accordance with claim 15, wherein the infusion rate of the reactive gas of step b) is 0.5 to 1000 *ml*/min.

26. (Amended) The method in accordance with claim 15, wherein the reactive gases of step b) are one or more gases selected from the group consisting of helium, hydrogen, oxygen, nitrogen, air, ammonia, carbon monoxide, carbon dioxide, carbon tetrafluoride, methane, N_20, and their mixtures.

27. (Amended) The method in accordance with claim 15, wherein the material of the polymer membrane of step a) is a polyolefin selected from the group consisting of polypropylene, high density polyethylene (HDPE), low density polyethylene (LDPE), and linear low density polyethylene (LLDPE).

28. (Amended) The method in accordance with claim 15, wherein the material of the polymer membrane of step a) is a polyolefin blend or polyolefin laminate, wherein the polyolefins are selected from the group consisting of polypropylene, high density polyethylene (HDPE), low density polyethylene (LDPE), and linear low density polyethylene (LLDPE).

29. (Amended) The method in accordance with claim 15, wherein the polymer membrane is a separator for a battery.

30. (Amended) The method in accordance with claim 29, wherein the battery is a lithium ion secondary battery or an alkali secondary battery.

31. (Amended) A method for providing hydrophilicity or increased hydrophobicity to the surface of a polymer comprising:

a) inserting a polymer into a vacuum chamber and irradiating the surface of the polymer with energized ionic particles under high vacuum and under conditions effective to change pore size and shape of the polymer; and

b) treating the surface-activated polymer obtained in step a) by infusing a reactive gas onto the surface of the polymer membrane to cause reaction of the gas with the polymer surface.